Claims

What is claimed is:
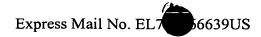
1. A method of optimizing cache management in a data storage device in operable communication with a host computer comprising steps of:

    (a) receiving a command from the host computer exhibiting a data usage pattern;

    (b) selecting a cache management algorithm based on the data usage pattern; and

    (c) employing the cache management algorithm to process the command.

2. The method of claim 1 wherein the selecting step (b) comprises steps of:

    (b)(i) updating a set of usage statistics in response to receipt of the command;

    (b)(ii) determining whether a change is detected in the data usage pattern; and

    (b)(iii) if a change is detected in the data usage pattern, selecting a cache management algorithm associated with the data usage pattern.

3. The method of claim 2 wherein the determining step (b)(ii) comprises steps of:

    (b)(ii)(1) correlating the set of usage statistics with a predetermined set of usage patterns associated with known host computer platforms to identify one of the host computer platforms that most closely matches the set of usage statistics.

4. The method of claim 2 wherein the data storage device is a disc drive having a data disc and the selecting step (b)(iii) comprises steps of:

    (b)(iii)(1) directing a cache management executive to execute the selected cache management algorithm.

5. The method of claim 4 wherein the directing step (b)(iii)(1) comprises steps of:

    (b)(iii)(1)(i) transmitting a base memory offset associated with the selected cache management algorithm to the cache management executive.

-20-

6. The method of claim 4 wherein the directing step (b)(iii)(1) comprises steps of:

   (b)(iii)(1)(i) changing a switch position to point to the selected cache management algorithms.

5   7. The method of claim 1 wherein the data storage device is a disc drive having a disc storing sets of cache management algorithms, the method further comprising steps of:

   (d) copying the sets of cache management algorithms from the data disc to memory.

8. The method of claim 3 wherein the data storage device is a disc drive having a data disc and
10   the method further comprises steps of:

   (d) copying the predetermined set of usage patterns from the data disc to memory.

-21-

9. A cache manager for managing caching in a data storage device comprising:

a usage statistics module storing statistics associated with a sequence of commands received by the data storage device;

a configuration module storing one or more sets of pattern data indicative of

5   predetermined patterns of command sequences; and

a correlator accessing the usage statistics module and the pattern data in the configuration module and correlating the usage statistics with the pattern data to determine a match between the usage statistics and one of the sets of pattern data.

10   10. The cache manager of claim 9 further comprising:

a statistics-gathering module operably connected to the usage statistics module for gathering statistics related to the received sequence of commands and transmitting the statistics to the usage statistics module.

15   11.   The cache manager of claim 10 further comprising:

a switch module receiving correlation data from the correlator and selecting one cache management algorithm from among a set of cache management algorithms based on the one or more sets of pattern data matched with the usage statistics; and

a cache management executive operable to execute the selected cache management

20   algorithm.

12.   The cache manager of claim 9 wherein each of the one or more sets of pattern data comprises a threshold value indicating a number of consecutive read commands corresponding to a read mode.

25

13.   The cache manager of claim 11 further comprising:

a notification signal transmitted by the switch module notifying the cache management executive of the selected cache management algorithm.

30   14.   The cache manager of claim 13 wherein the notification signal comprises:

a base memory pointer referencing a memory location storing the selected cache management algorithm.

15. A data storage device comprising:

a cache for buffering commands and data; and

a means for adaptively selecting a cache management algorithm based on command data.

16. The data storage device of claim 15 wherein the adaptive algorithm selection means comprises:

a usage statistics module storing usage statistics associated with a sequence of commands received by the data storage device;

a correlator in operable communication with the usage statistics module correlating the usage statistics with each of one or more sets of predetermined usage pattern data corresponding to known usage patterns and generating correlation data;

two cache management algorithms, wherein each cache management algorithm is associated with one of the known usage patterns; and

a switch module receiving the correlation data and determining a best match between the usage statistics and one of the one or more sets of predetermined usage pattern data and selecting one of the cache management algorithms based on the best match.

17. The algorithm selection system of claim 16 further comprising:

a cache management executive operably connected to the switch module, the cache management executive executing the selected one of the cache management algorithms.

18. The algorithm selection system of claim 16 wherein each of the one or more sets of predetermined usage pattern data includes a threshold value representing a number of consecutive read commands associated with a read mode.

19. The algorithm selection system of claim 16 wherein the predetermined usage pattern data include a threshold value representing a number of consecutive Write Direct Memory Access (DMA) and flush cache command pairs.

-24-

20. The algorithm selection system of claim 16 wherein the plurality of predetermined usage pattern data are from a set comprising Microsoft Windows® NTFS, Microsoft Windows® FATS, Unix, and Apple® operating systems.